(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization International Bureau



(43) International Publication Date 29 September 2005 (29.09.2005)

PCT

(10) International Publication Number WO 2005/090373 A1

(51) International Patent Classification7: C08F 4/642, 4/52, 110/02

C07F 17/00,

(21) International Application Number:

PCT/EP2005/002741

(22) International Filing Date:

15 March 2005 (15.03.2005)

(25) Filing Language:

German

(26) Publication Language:

German

EP

(30) Priority Data:

04006357.0 17 March 2004 (17.03.2004)

10 2004 055 922.8

19 November 2004 (19.11.2004) DE

- (71) Applicant (for all designated States except US): GEORG-AUGUST-UNIVERSITÄT GÖTTINGEN [DE/DE]; Wilhelmsplatz 1, 37073 Göttingen (DE).
- (72) Inventors; and
- (75) Inventors/Applicants (for US only): ROESKY, Herbert [DE/DE]; Emil-Nolde-Weg 23, 37085 Göttingen (DE).

BAI, Guangcai [CN/CA]; 320, Partington Ave, Windsor, ON N9B 2N5 (CA). JANCIK, Vojtech [CZ/DE]; Theodor-Heuss-Strasse 13, 37075 Göttingen (DE). SINGH, Sanjay [IN/DE]; Ginsterweg 8, 37077 Göttingen (DE).

- (74) Common representative: LAEUFER, Martina; Gramm, Lins & Partner GbR, Freundallee 13, 30173 Hannover (DE).
- (81) Designated states (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK. SL, SM, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.
- (84) Designated states (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH,

[continued on next page]

As printed

(54) Title: OXYGEN-BRIDGED BIMETALLIC COMPLEX, THE PRODUCTION THEREOF AND ITS UTILIZATION FOR POLYMERIZATION CATALYSIS

(54) Bezeichnung: SAUERSTOFFVERBRÜCKTER BIMETALLISCHER KOMPLEX, DESSEN HERSTELLUNG UND VER-WENDUNG PÜR DIE POLYMERISATIONS-KATALYSE

(57) Abstract: The binuclear, oxygen-bridged, hetero-bimetallic complexes of general formula [(LM1R1)(Cp2M2R2)]?-O) are suitable as polymerization catalysts for olefin polymerization. (M'= Al, Gc, Zr or Ti; M2= Zr, Ti or Hf; Cp = cyclopentadienyl; R1, R2 5/0903 = methyl, ethyl, i-propyl, t-butyl, halogen, phenyl, alkylphenyl, SiMc3; L = bidental, doubly nitrogen-coordinated organochemical ligand, which together with metal M1 form a 5- or six membered ring). These complexes have very good catalytic activity, good useful life and require less cocatalysts.

(57) Zusammenfassung: Die zweikernigen, sauerstoffverbrückten, hetero-bimetallischen Komplexe der allgemeinen Formel: [(LM¹R¹)(Cp₂M²R²)]µ-O) eignen sich al Polymerisations-Katalysatoren für die Olefinpolymerisation. (M¹= Al, Ge, Zr oder Ti; M2= Zr, Ti oder Hf; Cp = Cyclopentadienyl; R1, R2 = Methyl, Ethyl, i-Propyl, t-Butyl, Halogen, Phenyl, Alkylphenyl, SiMc3; L = bidentaler, zweifach Stickstoff-koordinierter organochemischer Ligand, der zusammen mit dem Metall M1 einen 5- oder 6-Ring bildet). Sie zeigen sehr gute kamlytische Aktivitäten, gute Standzeiten und erfordern wenig Cokatalysator.

WO 2005/090373 A1

GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IS, IT, LT, LU, MC, NL, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Declarations under Rule 4.17:

as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii)) for the following designations AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SM, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, UZ, VC, VN, YU, ZA, ZM, ZW, ARIPO patent (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ,

UG, ZM, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IS, IT, LT, LU, MC, NL, PL, PT, RO, SE, SI, SK, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG)

of inventorship (Rule 4.17(iv)) for the following designation US

Published:

- with international search report
- before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.